

COMPUTER SYSTEMS

Scope and Purpose

The purpose of this document is to provide a general description of the AS24 IT Program in one central location. This information will be used in determining future contractual requirements and as a tool for providing information about the AS24 IT Program to new employees and others with a need to know.

1. AS24 IT Program

The AS24 IT Program consists of the following four (4) projects:

- 1.1. **Computerized Maintenance Management System (CMMS)** - CMMS is a customized implementation of Maximo, a user-friendly windows-based COTS product. CMMS allows the user to maintain detailed facilities maintenance and work order status information and to schedule Preventive Maintenance (PM) tasks. In addition, CMMS calls attention to scheduled PM tasks not yet completed for the Facilities Management Office (FMO). This application provides maintenance managers and users closed-loop processing for the recurring day-to-day work functions required to inspect, operate, and maintain facilities (buildings, structures, grounds, utility systems, and collateral equipment) in an acceptable condition.

Workstations Recommended Requirements for CMMS are: Operating System: MS Windows 2000, File Server OS Version SP4, 256 megabyte (MB) of RAM · Network: Ethernet (TCP/IP) protocol · Browser: Internet Explorer 5.5 or later · Screen Resolution: 1024 x 768 · IBM Web sphere or BEA Web logic Application server software, Database Client software (Oracle JDBC drivers, SQL Plus, Oracle networking). Recommended Server requirements 2-4 dedicated, Intel based Pentium 800 MHz processors, 1 GB RAM per processor, 1 GB disk space, each instance of MAXIMO Server requires an additional 759 MG of storage.

Custom Software Applications include:

- 1.1.1. **CMMS Work Order Request (CWOR)** - CWOR is a web-based application that provides a way for customers of FMO to request work. The user supplies basic information about the work to be performed and this information is submitted to FMO Work Control personnel.
- 1.1.2. **CMMS Automated Work Request System (CAWRS)** - CAWRS is a Microsoft Access application that provides a way for FMO Work Control personnel to review work requests that have been submitted via CWOR.

After review of the request, Work Control personnel either accept or reject the request. If the work is rejected, feedback is e-mailed to the customer with the reason the work was not approved. If accepted, the work is entered into CMMS and the user is sent an e-mail containing the work order number.

- 1.1.3. **CMMS Work Order Status (CWOS)** - CWOS is a web-based application that provides a way for customers of FMO to look up the status of work orders. The user is provided a way to supply search criteria for the lookup. Only six months of data are made available for this process to limit the amount of data that can be returned using this utility.
- 1.1.4. **CMMS Work Order Email System (CWOES)** - CWOES is a Microsoft Access application that executes daily and reads the CMMS tables looking for work orders that have been completed or cancelled over the previous 24 hours. For each unique work order, an e-mail is generated and sent to the work order requestor stating the work order completion or cancellation with links to the web page where feedback can be supplied on the completed work.
- 1.1.5. **CMMS Customer Satisfaction Survey (CCSS)** - CCSS is a web-based application that provides a way for FMO personnel to get feedback from their customers on completed work orders. Feedback is collected in a database and used to generate customer satisfaction metrics.
- 1.1.6. **Mobile CMMS** – Mobile CMMS uses an **Asset@Hand** commercial-off-the-shelf remote interface application for the Computerized Maintenance Management System (CMMS). It is used by the Facilities Management Office and its maintenance contractor to improve the employee productivity by reducing the travel time, paper work and provide immediate access to critical data at the work site. There are two components to the software. One component provides a way for the users to remotely interface with the CMMS, through the use of a PDA to report work done on maintenance jobs and to issue supplies/tools from storerooms. The other component (portal) allows supervisory personnel to assign, review and edit information from their desktop prior to data being uploaded into the CMMS. MAXIMO generates electronic work order and distributes to the proper Foreman's computer (portal). Foreman assigns the work order electronically to Tradesman's PDA. Tradesman performs work, records time and materials through the PDA. The tradesmen also use the PDA to electronically read barcodes of equipment and import data into MAXIMO. If tradesman records discrepancy, discrepancy is transmitted electronically to Foreman's computer (portal) for resolution. Foreman resolves discrepancy and the work order is automatically closed out in MAXIMO. If there are no discrepancies, work order is automatically closed out in MAXIMO. The current hardware consist of Symbol MC9000, HP iPAQ hx4705. Components of the Mobile CMMS are depicted in Figure 1 and the system

architecture of the Mobile CMMS is shown in Figure 2. The @hand software is designed to support at least 110 users with a potential capacity of up to 200 users. In the future, it is expected that the Mobile CMMS will transition to an SAP R/3 backend.

Component	Description
Software	
Assets@hand	A mobile CMMS solution with job-specific mobile applications and a mobile application server. Supports all @ hand applications by providing services for connectivity, transaction management, security, and integration.
Existing Systems	
MAXIMO 5.2 In process of moving to 6.0	An asset management and maintenance system used by MSFC Facilities Engineering Department to track and manage preventative maintenance, trouble call work orders, Inspections, and equipment.
Hardware	
Windows Server 2003 servers	The Assets @hand Mobile Server software package is installed on Windows Server 2003 servers.
Windows Mobile Handheld Devices	Assets@hand mobile applications are deployed to Windows Mobile handheld devices.

Figure 1 – Components of Mobile CMMS

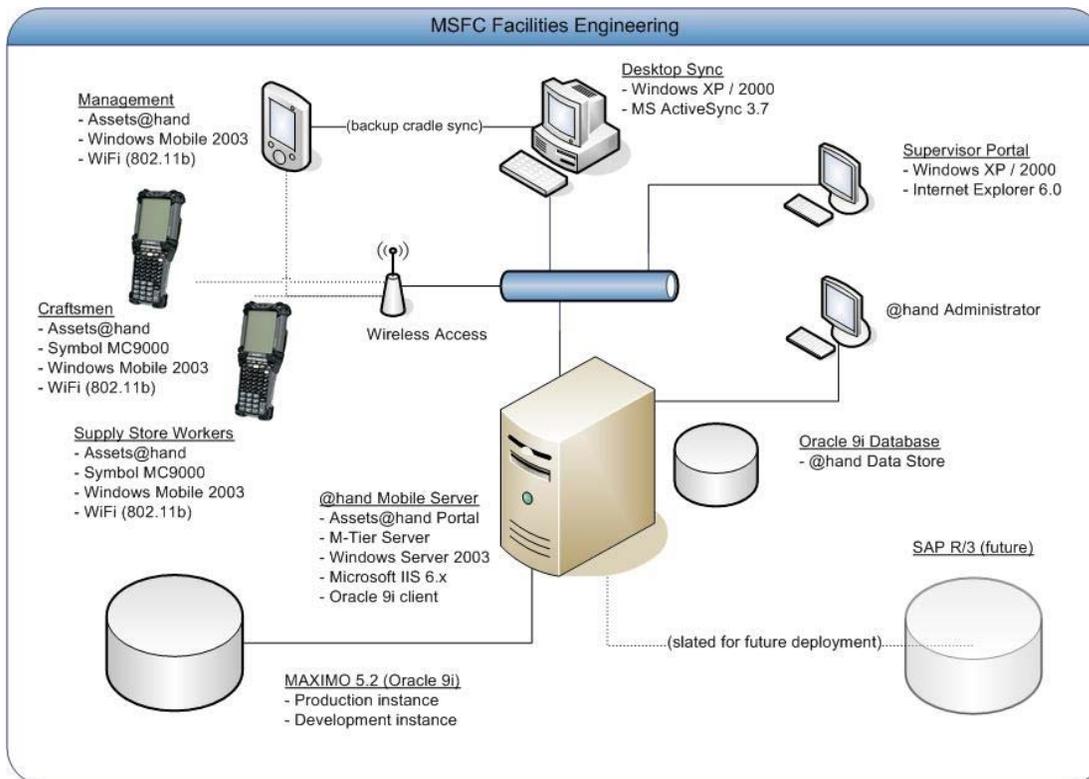


Figure 2. - Mobile CMMS System Architecture

The Mobile CMMS has an FCA application that tracks conditions of Equipment and Facilities by recording assessment ratings as remarks of Systems Engineers. Equipment assessments use a series of inspection rating scores to determine an overall assessment value. Mobile CMMS FCA implements the Facilities Assessments and Remarks within the framework of the Mobile CMMS Portal, and integrates equipment information in the existing Facilities Equipment Database (FED) with MAXIMO equipment.

In addition, Inspections are done by a third party using the PDA to capture data from the inspections at the site. As with the FCA process, the inspections are implemented within the framework of the Mobile CMMS Portal and are integrated with the MAXIMO database.

- 1.2. **Machinery Health Manager** - Combining predictive maintenance techniques with comprehensive analysis tools, the Machinery Health Manager allows for easy and accurate assessment of the machinery health in any facility. It incorporates multiple diagnostic technologies into a common database for comprehensive analysis of machinery degradation symptoms. Analytical capabilities through automated diagnostics, plotting and reporting allow the user to document, trend and communicate all details of machinery health in order to gauge accurate asset condition, advise appropriate actions, prioritize, and plan daily maintenance activities.

Workstations Minimum Requirements for Machinery Health Manager are:
Operating System: Windows 2000 SP4 or greater, Windows XP Professional ·
Processor Speed: 800 MHz, 256 megabyte (MB) of RAM · Network: Ethernet (TCP/IP) protocol · Browser: Internet Explorer 5.5 or later · Screen Resolution: 1024 x 768 · Other RS232 serial communications port (9-pin), USB port, LPT port.

The software works in conjunction with CSI portable analyzers to collect information for a comprehensive analysis using these technologies:

- 1.2.1. **Vibration Analysis** - Vibration input from portable analyzer provides trending information that recognizes developing faults ranging in scope from imbalance and misalignment to premature bearing and gear failures. Then corrective technology modules document and report on laser alignment and balancing both before and after corrective action is taken.
- 1.2.2. **Oil analysis** - This module offers features for bench-top oil analysis equipment operation, full laboratory analysis management, and advanced wear debris analysis.

- 1.2.3. **Ultrasonic** - This module trends and reports ultrasonic data for detecting compressed gas or air leaks, steam trap and valve analysis, and contact probe bearing lubrication analysis
- 1.2.4. **Motor Diagnostics** - This module offers temperature trending analysis, phase voltage analysis, flux stator analysis and rotor bar analysis
- 1.2.5. **Infrared Thermography** - This module receives infrared routes from the infrared camera and performs post-scan analysis of the images for temperature profiling, isotherms, and correlating infrared data with other predictive technologies in the same database to give a diagnostic picture of actual machine health. These multiple integrated technologies provide you with checks and balances that assure you that the machines are running within tolerances
- 1.2.6. **RBMView** - This is an application in the AMS Suite: Machinery Health Manager application that allows all personnel in the facility - from the end user who logs daily findings to top management concerned with the business impact of machinery reliability - a way to stay informed of machinery health critical to production. This is a point and click user-friendly interface used to view instant machinery health status information on a single asset or the entire facility.
- 1.2.7. **Diagnostic Analysis Module** - This module reduces data analysis time by reviewing more data at once, provides flexible windows explorer type user interface for easy navigation, will plot trends, spectrums, wave forms and orbits from both portable route data and online data. It has many analysis tools available in a new user-friendly format-fault frequencies, plot overlays, parameter alarms, peak locators, peak list, label peaks, harmonic and sideband cursors, revolution markers and plot annotations.
- 1.3. **FacGIS** – FacGIS is an online application used to provide web-based access to GIS, Facilities information, Computerized Maintenance Management System (CMMS) reporting, Mapping & Utilities, Master floor plans, Space utilization, Aerial photos, Building photos, and Archives. FacGIS is a portal that obtains data from various separate data sets that are in various formats and provides easy-to-use Facilities mapping, data integration, reporting, etc. capabilities from a web environment which can be accessed from the user’s desktop. Its architecture is scalable to allow new data access portals, components, functions, and applications to be added in the future. It has a security module that limits access to data, based on user or group.

Workstations Minimum Requirements for Facilities Geographical Information System; Operating system: Windows 2000 (SP2 or greater) or Windows XP Professional; Processor Speed: 800mhz or faster,256 megabyte (MB) of RAM

Network: Ethernet (TCP/IP) protocol; Browser: Internet Explorer 5.5 or later
Screen Resolution: 1024 x 768 (best viewed @ 1280 x 1024); Other: RS232
Serial comm. Port (9 pin) & USB port, LPT Port

1.4. Facilities Condition Assessment (FCA) – FCA uses the Facilities Equipment Database (FED) which is based on Microsoft Access with information tables stored in an Oracle database. Currently, part of this database contains nameplate data which stores data about various pieces of equipment; however, this nameplate data will eventually be moved to Maximo and eliminate the need for this area of the database. Assessment data is entered into the database upon completion of periodic visual and functional examination of Facilities equipment (architectural, electrical, mechanical and HVAC). The FED database uses an algorithm to provide a condition of the equipment with ratings, maintain a history of equipment specs, and help generate the Backlog of Maintenance and Repairs (BMAR) associated with equipment repair and/or replacement. Reports can be generated that will aid COSS engineers in knowing the condition of equipment and when Preventive Maintenance should be performed.

Workstations Minimum Requirements for Facilities Condition Assessment (FCA) are: Operating System: Windows 2000 SP4 or greater, Windows XP Professional · Processor Speed: 800 MHz, 256 megabyte (MB) of RAM · Network: Ethernet (TCP/IP) protocol · Browser: Internet Explorer 5.5 or later · Screen Resolution: 1024 x 768 · Other RS232 serial communications port (9-pin), USB port, LPT port. Access is necessary and a Maximo account is necessary.